REMARKS

Claims 1-32 are pending in the application. Claims 1-32 have been examined and stand rejected. Claims 1, 13, 14, 20 and 27 have been amended to more clearly define the invention. Reconsideration and allowance of the claims are respectfully requested.

THE CLAIMS

Rejection of Claims 1-12, 15, 16 and 19-30 Under 35 U.S.C. §103(a)

Claims 1-32 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Isaka *et al* (U.S. Patent Publication 2002/0138254) and Balan *et al* (U.S. Patent Publication 2003/0233213) and further in view of Oh *et al* (U.S. Patent No. 5,353,376).

The rejection indicates that Isaka discloses most of the elements of claim 1 except that "the speech processing apparatus mounted on a mobile communication device, the signal detectors forming a small array." The rejection states that Balan discloses this feature of claim 1. The rejection further indicates that the combination of Isaka and Balan does not disclose "a controller operatively coupled to the first and second beamformers configured to enable the first beamformer to adapt during periods of speech activity and the second beamformer to adapt during periods of non-speech activity." The rejection states that Oh discloses this feature of claim 1.

Claim 1 of the Present Invention

Claim 1 of the present invention, as amended, recites:

"A mobile communication device comprising:

a plurality of signal detectors mounted on the mobile communication device, the plurality of signal detectors being placed in close proximity to one another and forming a small array, each signal detector configured to provide a respective detected signal having a desired component plus an undesired component;

a first beam forming unit operatively coupled to the plurality of signal detectors and configured to process the plurality of detected signals to generate a first signal having the desired component plus a portion of the undesired component;

a second beam forming unit operatively coupled to the plurality of signal detectors and configured to process the plurality of detected signals to generate a second signal having mostly the undesired component;

an activity detector configured to receive the first and second signals, to detect for speech activity based on the first and second signals, and to provide a control signal indicative of detected speech activity;

a controller operatively coupled to the first and second forming units and the activity detector and configured to receive the control signal, to enable the first beam forming unit to adapt during periods of speech activity, and to enable the second beam forming unit to adapt during periods of non-speech activity; and

a noise suppression unit operatively coupled to the first and second beam forming units and configured to receive and digitally process the first and second signals to obtain an output signal having substantially the desired component and a large portion of the undesired component removed."

Applicant submits that claim 1 is patentable over Isaka in view of Balan and further in view of Oh for at least the following reasons.

First, the combination of Isaka, Balan and Oh does not disclose "an activity detector ... to detect for speech activity based on the first and second signals, and to provide a control signal indicative of detected speech activity," as recited in claim 1. The rejection indicates that Oh discloses an activity detector in column 5, line 35-43. This section describes requiring a speaker "to push a button or flip a toggle switch indicating his intention to use the phone" and triggering adaptive noise canceller (ANC) filter adaptation based on this action. Oh thus discloses detecting for potential activity based on human action. In contrast, claim 1 recites detecting for speech activity based on the first and second signals from the beam forming units. The activity detector of claim 1 is thus different from Oh and is able to detect for actual activity during an entire duration of a call instead of potential activity at the start of a call.

Second, the combination of Isaka, Balan and Oh does not disclose "a controller ... to enable the first beam forming unit to adapt during periods of speech activity, and to enable the second beam forming unit to adapt during periods of non-speech activity," as recited in claim 1. The rejection states that Oh discloses adapting the noise beamformer during periods of non-speech activity. The rejection further states that one of ordinary skill in the art would have realized that the target signal beamformer should be adapted during periods of speech activity.

Oh discloses a single adaptive filter used for noise cancellation. This adaptive filter may correspond to adaptive filter **450** in FIG. 4 of the present application.

Oh does not disclose any beam forming units and hence does not perform adaptation of these beam forming units. Furthermore, Oh discloses a very crude method of determining when to adapt, which appears to be applicable only at the start of a call. Oh does not disclose detecting for speech activity based on signals, does not enable the first beam forming unit during periods of speech activity, and does not enable the second beam forming unit during periods of non-speech activity.

The rejection indicates that one of ordinary skill in the art would have realized to adapt the target signal beamformer during periods of speech activity. However, none of the cited references discloses this feature. It is with the benefit of hindsight that this feature may have appeared obvious.

Third, there is no motivation to combine Isaka and Balan. Balan discloses techniques for source separation and other purposes when using a two microphone system. Balan states "traditionally array processing and beamforming signal processing techniques were principally concerned with formation of steered beams for an array of sensors." (See paragraph 0004.) Balan discloses computing the ratio of short time Fourier transform (STFT) coefficients of signals received at two sensors. (See paragraph 0016.) Balan arguably teaches away from combining with beamforming techniques, and hence against being combined with Isaka.

Thus, Applicant submits that claim 1 is patentable over Isaka in view of Balan and further in view of Oh. Claims 2-19 are dependent on claim 1 and are also patentable over Isaka in view of Balan and further in view of Oh for at least the reasons noted above for base claim 1. These dependent claims may recite features not described by Isaka, Balan or Oh.

Independent claims 20 and 27 have each been amended to recite features similar to those described above for claim 1. Claims 21-26 are dependent on claim 20, and claims 28-30 are dependent on claim 27. These claims are patentable over Isaka in view of Balan and further in view of Oh for the reasons noted above for base claim 1.

Independent claim 31 recites "the first microphone configured to provide a first signal having a desired component plus a portion of an undesired component, and the second microphone configured to provide a second signal having mostly the undesired component." This feature is not disclosed by Isaka, Balan or Oh. Claim 32 is dependent

on claim 31. Claims 31 and 32 are also patentable over Isaka in view of Balan and further in view of Oh.

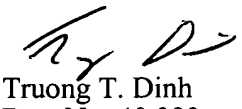
Accordingly, the §103(a) rejection of claims 1-32 should be withdrawn.

CONCLUSION

Applicant believes all claims now pending in this application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at (650) 289-0600.

Respectfully submitted,



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